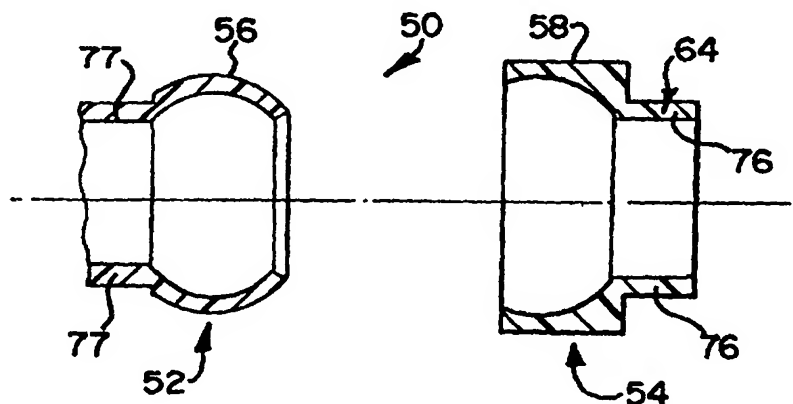




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(21) International Application Number: PCT/US97/02450 (22) International Filing Date: 14 February 1997 (14.02.97) (30) Priority Data: 96/1246                      16 February 1996 (16.02.96)      ZA (71) Applicant (for all designated States except MW US): INTER- NATIO (PROPRIETARY) LIMITED [ZA/ZA]; 6 Jacobs Street, Chamdor, Krugersdorp, Gauteng (ZA). (71) Applicant (for MW only): HANDELMAN, Joseph, H. [US/US]; 26 West 61st Street, New York, NY 10023 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): ROBINSON, David, James [ZA/ZA]; 12 Daffodil Avenue, Farramere, Benoni, 1500 (ZA). INGLETHORPE, David, Alan [US/US]; 27 Protea Glen, Ouhout Avenue, Weltevreden Park, 1709 (ZA). WRIGHT, Norman, Gerald [ZA/ZA]; 43 5th Street, Krugersdorp North, 1939 (ZA). MITCHELL, Redvers, George [ZA/ZA]; 7 Pitlochry, 280 Wilson Street, Fairland, 2195 (ZA). (74) Agents: HANDELMAN, Joseph, H.; Ladas & Parry, 26 West 61st Street, New York, NY 10023 (US) et al.	(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: COUPLING ARRANGEMENT



## (57) Abstract

A coupling is provided for coupling an electrical conduit to a casing. The coupling includes attachment means which is configured to attach the electrical conduit to the casing in such a fashion so as to allow the conduit to tilt relative to the casing. The coupling includes a first connecting component connectable to the electrical conduit, and a second connecting component connectable to the casing. The attachment means attaches the first and the second connecting components to each other and is configured to allow the first and the second connecting components to tilt relative to each other.

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## COUPLING ARRANGEMENT

THIS INVENTION relates to a coupling. It relates in particular to a coupling for coupling an electrical conduit to a casing. It also relates to a connecting component of the coupling and to a closure member for the coupling. Further, it relates to an electrical junction housing to which at least one electrical  
5 conduit is connectable by the coupling. It also relates to an electrical installation including the coupling.

Conventionally, an electrical installation within a building, such as a dwelling, office block, or the like, comprises an extensive layout of interconnected electrical conduits, typically PVC conduits, which have electrical cables of an  
10 electrical system of the building running therein. The electrical conduit is usually coupled to a casing of a housing such as a downlighter box, an inspection elbow, a T-piece, a wall socket box, a switch box, or the like. It is this application of the invention which should be predominantly, but not exclusively, borne in mind. For the purposes of this specification, the term "electrical conduit" is intended to  
15 include any conduit, pipe, or tube in which an electrical cable may be located in use, and the term "casing" is intended to include any casing or housing to which the electrical conduit may be connected.

According to the invention, there is provided a coupling for coupling an electrical conduit to a casing, the coupling including attachment means which  
20 is configured to attach the electrical conduit to the casing in such a fashion so as to allow the conduit to tilt relative to the casing.

The coupling may include

a first connecting component connectable to the electrical conduit; and

25 a second connecting component connectable to the casing, the attachment means attaching the first and the second connecting components to each other

and being configured to allow the first and the second connecting components to tilt relative to each other.

The attachment means is typically configured to allow relative angular movement between the first and the second connecting components in any plane.

- 5                   The attachment means may be in the form of a flexible joint e.g. a corrugated tubular joint such as bellows, or the like.

                  The attachment means may include a socket formation and a complementary head formation which is receivable within the socket formation. The socket and head formations may be configured to allow them to tilt relative to each  
10 other. Typically, the head formation is part-spherical in shape including a passage defined therein through which an electrical cable passes in use.

                  The coupling may define a composite coupling. Accordingly, the attachment means may be similar to a ball-and-socket joint.

- The first connecting component may define the head formation and  
15 the second connecting component may define the socket formation. Instead, the first connecting component may define the socket formation and the second connecting component may define the head formation.

                  The head formation may be formed by a circular ring which is rounded in a plane perpendicular to its radial plane.

- 20                   Typically, the head formation is receivable at least partially within the socket formation in a snap-fit fashion. Accordingly, the head and/or socket formation may be formed from a synthetic plastics material, e.g. PVC or the like. Additionally or instead, the head formation may be received within the socket formation with a friction fit.

The first connecting component may include first connection means for connecting it to the electrical conduit. The first connection means may be in the form of a conduit socket which is shaped and dimensioned to receive an end of the electrical conduit. Typically, the conduit socket is formed by a portion of  
5 hollow tubing having an internal diameter which marginally exceeds and outer diameter of the electrical conduit so that the end of the electrical conduit is snugly receivable therein.

Preferably, the end of the electrical conduit is receivable within the tubing with a friction fit and, preferably, in a sealing fashion.

10 The second connecting component may include second connection means for connecting it to the casing. The casing may be, for example, the casing of a downlighter box, an inspection elbow, a T-piece, a wall socket box, a switch box, or the like. Further, the casing may be the casing of a further electrical conduit. Accordingly, the coupling may be used to couple two  
15 conduits.

Typically, a conventional casing of a downlighter box, a conduit box, a switch box, a wall socket box, or the like, has a generally circular opening defined therein for inserting an end of an electrical conduit therein. Accordingly, the second connection means may be in the form of a circular  
20 peripheral lip which is receivable within the circular opening defined in the casing with a friction fit. The peripheral lip may be attached to and stand proud of the socket formation. Instead, the peripheral lip may be attached to and stand proud of the head formation.

In certain conventional casings, the generally circular opening is  
25 defined by a hollow cylindrical formation which stands proud of the casing. The cylindrical formation is configured to receive an end of an electrical conduit thereby to couple the conduit to the casing. Accordingly, one of the first and the second connection means may be in the form of a hollow cylindrical tubular member which

is shaped and dimensioned to be receivable within a conventional cylindrical formation of a conventional casing thereby to convert the conventional casing for connection to the coupling.

In certain embodiments of the invention, the second connecting  
5 component is formed integrally with the casing e.g. the second connecting component may be formed integrally with the casing of a downlighter box, or the like. Typically, the peripheral lip of the second connecting component is formed integrally with the casing.

Further according to the invention, there is provided a connecting  
10 component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a head formation which is receivable in a socket formation of the composite coupling, and connection means configured to connect the connecting component to the electrical conduit.

Still further according to the invention, there is provided a connecting  
15 component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a head formation which is receivable in a socket formation of the composite coupling, and connection means configured to connect the connecting component to the casing.

The head formation may be part spherical in shape including a  
20 passage defined therein into which an electrical cable passes in use.

Still further according to the invention, there is provided a connecting  
component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a socket formation in which a head formation of the composite coupling is receivable, and connection means configured to  
25 connect the connecting component to the electrical conduit.

Still further according to the invention, there is provided a connecting

component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a socket formation in which a head formation of the composite coupling is receivable, and connection means configured to connect the connecting component to the casing.

- 5           The connecting component may be mounted on an otherwise conventional multi-purpose push-in system such as an OGATIN push-in coupling currently available in South Africa. Accordingly, the connection means may include a plurality of resilient members arranged circumferentially and biased radially outwardly and configured to be received within an opening in the casing  
10 in a lockable fashion.

- Instead, the connection means may include an externally screw-threaded shaft for receiving a lock-ring, the screw-threaded shaft being insertable through an opening in the casing thereby to connect the composite coupling to the  
15 casing. Accordingly, the coupling may be used for connecting an electrical conduit to a rear panel of a stove, or the like.

          The connection means may include a gland-bolt arrangement for compressing a gland into frictional engagement with an electrical cable passing therethrough.

- 20           The connection means may be in the form of a conduit socket which is shaped and dimensioned to receive an end of the electrical conduit. Typically, the conduit socket is formed by a portion of hollow tubing having an internal diameter which marginally exceeds an outer diameter of the electrical conduit so that the end of the electrical conduit is snugly receivable therein.

- 25           Still further according to the invention, there is provided a connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including two head formations which are mounted relative to each other in a back-to-back fashion and which are each receivable in

a socket formation of the composite coupling.

Still further according to the invention, there is provided a connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a socket formation and a complementary head formation which are mounted relative to each other in a back-to-back fashion.

The head formation is typically part-spherical in shape including a passage defined therein through which an electrical cable passes in use.

Still further according to the invention, there is provided a closure member of a composite coupling for coupling an electrical conduit to a casing, the closure member including a head formation which is receivable within a socket formation of a connecting component of the composite coupling thereby to close the socket formation.

Still further according to the invention, there is provided a connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including two socket formations which are mounted relative to each other in a back-to-back fashion and which are shaped and dimensioned to receive a head formation of the composite coupling.

Still further according to the invention, there is provided an electrical junction housing to which at least one electrical conduit is connectable by a composite coupling, the junction housing including

a casing defining a hollow compartment into which an electrical cable passes in use;

at least one connecting component of the composite coupling, the connecting component being connected to the casing and configured to engage a complementary connecting component of the composite coupling to which the complementary connecting component the electrical conduit is connectable, the connecting component being configured to allow the electrical conduit to tilt



relative to the casing.

The connecting component may include connection means connected to the casing, and a socket formation attached to the connection means, the socket formation being configured to receive a part-spherical head formation of the  
5 complementary connecting component.

Instead, the connecting component may include connection means connected to the casing, and a part-spherical head formation which is receivable in a socket formation of the complementary connecting component.

The connecting component may be formed integrally with the casing  
10 in a moulding of synthetic plastics material.

The casing may be defined by a circular side wall, and a circular base which is fixedly attached to an end of the circular side wall to define the hollow compartment. Typically, the casing is in the form of a downlighter box.

In certain embodiments of the invention, the casing is defined by four  
15 rectangular side walls and a rectangular base from which the side walls extend transversely to define the hollow compartment. Accordingly, the housing may be in the form of a wall socket box, a switch box, or the like.

In other embodiments of the invention, the casing defines an elbow connection having opposed ends which are at a right-angle relative to each other,  
20 a connecting component being provided at each opposed end of the elbow connection.

The casing may define a longitudinal passage with a connecting component provided at each end thereof, and a transverse passage leading into the longitudinal passage at its one end and a connecting component being provided at  
25 its other end. Accordingly, the casing may be in the form of a T-piece coupling,

or the like.

The invention extends to an electrical conduit installation in a building, the installation including a plurality of couplings as hereinbefore described.

The invention is now described, by way of example, with  
5 reference to the accompanying diagrammatic drawings.

In the drawings,

Figure 1 shows, on an enlarged scale, an exploded longitudinal sectional view of a coupling in accordance with the invention;

Figure 2 shows, on an enlarged scale, a longitudinal sectional view of the  
10 coupling of Figure 1 in its assembled form;

Figure 3 shows, on an enlarged scale, a longitudinal sectional view of the coupling of Figure 2 which has its socket tilted upwardly relative to its plug;

Figure 4 shows, on an enlarged scale, a longitudinal sectional view of the coupling of Figure 2 which has its socket tilted downwardly relative to its plug;

15 Figure 5 shows a three-dimensional view of a four-way conduit box accessory which includes four of the couplings;

Figure 6 shows a three-dimensional view of a wall socket box accessory including the coupling of Figure 2;

Figure 7 shows an inspection elbow joint coupling accessory including a  
20 coupling mounted at each of its ends;

Figure 8 shows a three-dimensional view of a downlighter box accessory including two couplings attached to a casing thereof;

Figure 9 shows a three-dimensional view of a female-female coupling accessory, in accordance with the invention;

25 Figure 10 shows a longitudinal sectional view of the female-female coupling accessory of Figure 9;

Figure 11 shows a three-dimensional view of a lock-ring adapter accessory including the coupling of Figure 2;

Figure 12 shows a longitudinal sectional view of the lockring adapter

accessory of Figure 11;

Figure 13 shows a three-dimensional view of a closure member accessory which includes a plug of the coupling of Figure 1;

Figure 14 shows a longitudinal sectional view of the closure member  
5 accessory of Figure 13;

Figure 15 shows a three-dimensional view of a push-in coupling accessory which has an otherwise conventional push-in coupling attached to the coupling of Figure 2;

Figure 16 shows a longitudinal sectional view of the push-in coupling  
10 accessory of Figure 15;

Figure 17 shows a three-dimensional view of a gland-bolt accessory which includes a plug of the coupling of Figure 1 attached to an otherwise conventional gland-bolt;

Figure 18 shows a longitudinal sectional view of the glandbolt accessory of  
15 Figure 17;

Figure 19 shows a three-dimensional view of a male-male coupling accessory in accordance with the invention;

Figure 20 shows a longitudinal sectional view of the male-male coupling accessory of Figure 19;

Figure 21 shows a three-dimensional view of a male-female coupling accessory in accordance with the invention;

Figure 22 shows a longitudinal sectional view of the male-female coupling accessory of Figure 21;

Figure 23 shows a three-dimensional view of the plug of Figure 1 having a  
25 first connection means in the form of socket attached thereto;

Figure 24 shows a longitudinal sectional view of the plug and socket arrangement of Figure 23;

Figure 25 shows a three-dimensional view of a T-piece coupling accessory including a coupling attached to each end thereof;

Figure 26 shows a three-dimensional exploded view of a conventional one-way conduit box and a conversion accessory, in accordance with the invention;

Figure 27 shows a three-dimensional view of the conversion accessory

shown in Figure 26;

Figure 28 shows a longitudinal sectional view of the conversion accessory of Figure 27; and

Figures 29 to 36 show longitudinal sectional views of the  
5 accessories shown in Figures 9 to 24 which have been integrally moulded.

In the drawings, reference numeral 50 (see Figures 1  
to 4) generally indicates a coupling in accordance with the invention. The coupling  
50 includes a first connecting component 52, a second connecting component 54,  
and attachment means 55 (see Figure 2) defined by the first connecting  
10 component 52 and the second connecting component 54. The attachment means  
55 is configured to attach the first connecting component 52 to the second  
connecting component 54 in such a fashion so as to allow the first and second  
connecting components 52, 54 to tilt relative to each other.

The attachment means includes a head formation (which is defined  
15 by the first connecting component 52) in the form of a plug 56 which is receivable  
partially within a socket 58 (which is defined by the second connecting component  
54). The plug 56 and the socket 58 are complementary in shape and the plug 56 is  
shaped and dimensioned to be received within the socket 58 in a snap-fit fashion  
and with a friction fit.

20 The plug 56 is formed by a ring which is rounded in a  
plane perpendicular to its radial plan and is part spherical in shape and thus similar  
to a ball of a ball-and-socket joint. Accordingly, the coupling 50 is configured to  
allow relative angular movement between the first and second connecting  
components 52, 54 in any radial plane as shown in a vertical radial plane in Figures  
25 3 and 4.

The first connecting component 52 has first connection  
means 60 (see Figures 23 and 24 in particular) for connecting, preferably in a  
sealing fashion, the first connecting component 52 to an electrical conduit 62.

The second connecting component 54 has second connection means 64 (see Figures 1 to 4) for connecting it to a casing 66 (see Figures 5, 6, 7 and 8). The casing 66 may be the casing of a downlighter box accessory 68 (see Figure 8), an inspection elbow joint coupling accessory 70 (see Figure 7), a four-way conduit  
5 box accessory 72 (see Figure 5), a wall socket box accessory 74 (see Figure 6), a T-piece coupling accessory 75 (see Figure 25), or the like. In certain embodiments of the invention, the casing 66 is the casing of a further electrical conduit (not shown) and, accordingly, the coupling 50 may be used to couple two electrical conduits to each other.

10 In certain embodiments of the invention, the second connection means 64 of the second connecting component 54 is formed integrally with the casing 66. In other embodiments of the invention, the second connection means 64 includes a circular peripheral lip 76 (see in particular Figures 1 to 4) which is received within an opening 78 (see  
15 Figures 5, 6, and 8) in the casing 66. The peripheral lip 76 may be received by way of a friction fit within the opening 78 or a suitable adhesive may be used to secure the second connection means 64 to the casing 66.

The first connection means 60 (see for example Figures 23 and 24) is formed by a portion of hollow tubing which defines  
20 a conduit socket 80 (see Figures 11, 12, 15, 16, 23 and 24) which has an inner diameter 82 (see Figure 12) which marginally exceeds an outer diameter 84 of the electrical conduit 62 so that the electrical conduit 62 is received within the conduit socket 80 with a friction fit and in a sealing fashion. The conduit socket 80 has a reduced diameter at 86 (see Figure 12) in which a  
25 peripheral lip 77 the first connecting component 54 is received with a friction fit. To attach the electrical socket 80 more securely to the plug 56 a suitable adhesive may be used.

Referring to Figures 15 and 16, reference numeral 90 generally indicates a push-in coupling accessory which includes

a coupling 50 attachable by means of a conduit socket 80 to an electrical conduit 62, and a conventional push-in arrangement 92 (such as a push-in coupling currently available on the market in South Africa under the trade name Ogatin) which is configured to push into an opening (not shown) of a conventional casing.

5 The

push-in arrangement 92 has a plurality of conventional circumferentially equally spaced engaging formations 94 which extend through the opening in use, and which are resiliently biased in a radially outward direction in a lockable fashion thereby to inhibit the push-in arrangement 92 from being detached from the  
10 opening. Accordingly, the push-in coupling 90 may be used to connect the coupling 50 to an otherwise conventional casing.

Referring in particular to Figures 17 and 18, reference numeral 96 generally indicates a gland bolt accessory. The gland bolt accessory 96 comprises a first connecting component 52 having a peripheral lip 77 (see Figure 18 and also  
15 Figure 1) which is snugly and sealingly received within an opening 78 of a gland bolt 98 with a friction fit. The gland bolt 98 is otherwise conventional having a gland 100 which is compressed in use to engage an electrical cable which runs in the electrical conduit 62 in use.

20 Referring to Figures 9 and 10, reference numeral 110 generally indicates a female-female coupling accessory which includes two sockets 58 mounted in a back-to-back fashion (see Figure 10). A ring 112 is provided which has an inner diameter which marginally exceeds an outer diameter of each peripheral lip 76 of each  
25 second connection means 64 (see Figure 1). Accordingly, the peripheral lip 76 of each socket 58 may be urged into each opposed end of the ring 112 with a friction fit and in a sealing fashion. The female-female coupling accessory 110 may be attached to a plug 56 thereby to couple the plug 56 to a similar plug.

Likewise, referring to Figures 19 and 20, reference numeral 114 .

generally indicates a male-male coupling accessory which also includes a ring 112 for mounting two plugs 56 in a back-to-back fashion as hereinbefore described with reference to the female-female coupling accessory 110. A peripheral lip 77 of the first connection means is snugly  
5 received within opposed ends of the ring 112. It is to be appreciated however that in certain circumstances, the peripheral lips 76 and 77 may not have the same outer diameter and thus the inner diameters of the rings 112 of the male-male coupling accessory 114 and the female-female coupling accessory 110 may differ.

10 Referring to Figures 21 and 22, reference numeral 116 generally indicates a male-female coupling accessory which includes a socket 58 and a plug 56 which are attached in a back-to-back fashion. The plug 56 and the socket 58 are attached to each other by means of a stepped ring 118 which has a narrow portion 120 which is configured sealingly to receive the peripheral lip 77 of the  
15 plug 56 with a friction fit. The stepped ring 118 also has a broad portion 122 which has an inner diameter which is configured sealingly to receive the peripheral lip 76 of the socket 58 with a friction fit. The male-female coupling accessory 116 may be used as a spacer when coupling a plug 56 to a socket 58.

20 Referring to Figures 13 and 14, reference numeral 124 generally indicates a closure member accessory in accordance with the invention. The closure member accessory 124 has a plug 56 and a closure member in the form of a disc 126 which is fixedly attached thereto. The closure member accessory 124 is configured to fit into a  
25 socket 58 thereby sealingly to close it off. Typically, when a plurality of sockets 58 are formed integrally with a casing 66, and all the sockets 58 are not coupled to electrical conduits 62, unused sockets 58 may be closed off by means of the closure member accessory 124. It is to be appreciated however that the disc 126 may instead be fixedly attached to a socket 58 thereby to provide a closure  
30 member accessory for the second connecting component 54.

Referring to Figures 11 and 12, reference numeral 128 is generally indicates a lock-ring adaptor accessory. The lock-ring adaptor accessory 128 includes a conduit socket 80 attached to an otherwise conventional lock-ring assembly 130 by a coupling 50. The lock-ring assembly 130 is defined by an  
5 external screwthread 132 which is provided on the peripheral lip 76 and an internally screw-threaded ring 134 which is received thereon. The lock-ring adaptor accessory 128 may be used to connect an electrical conduit to a rear panel of a stove, or the like having an appropriately sized opening in a casing thereof.

The coupling 50 in its assembled form defines a passage  
10 140 (see Figures 2 to 12 and 15 to 25) through which at least one electrical cable 142 (shown only in Figure 2) is usually drawn.

In use, in order to connect an electrical conduit 62 to a casing 66, the electrical conduit 62 is cut to an appropriate length and urged into the conduit socket 80 wherein  
15 it is sealingly retained with a friction fit. The casing 66 may then be tilted relative to the electrical conduit 62 in order, for example, to align the casing 66 of a wall socket box accessory 74 (see Figure 6) with an opening provided in a wall (not shown) of the building. If a further electrical conduit is required to be attached to the casing 66, a further coupling 50 may be provided and its conduit socket 80  
20 may be tilted relative to the casing 66 to facilitate urging of the further electrical conduit into the first connection means 52 defined by the conduit socket 80.

Referring to Figures 26 to 28 of the drawings, reference numeral 150 generally indicates a conventional one-way conduit box which has a hollow cylindrical formation 152 formed integrally with a casing 66. The cylindrical  
25 formation 152 is configured to receive a short tubular member 154 of a conversion accessory 156, in accordance with the invention. The conversion accessory 156 comprises the short tubular member 154 which is integrally moulded with a socket 58 as hereinbefore described. The short tubular member 154 is shaped and dimensioned to be received snugly and with a friction fit within



the hollow cylindrical formation 152. The conversion accessory 156 allows the conventional one-way conduit box 150 to be coupled via the socket 58 to a plug 56.

Referring to Figures 29 to 36 of the drawings, the various accessories illustrated therein are similar to those depicted in Figures 9 to 24 of the drawings and, accordingly, like reference numerals have been used to indicate the same or similar features. Unlike the accessories depicted in Figures 9 to 24 of the drawings which are composite in nature being constructed from discrete components, the accessories depicted in Figures 29 to 36 of the drawings are formed integrally, typically moulded, from a synthetic plastics material.

Although the coupling 50 may be used to couple electrical conduits 62 of any diameter to casings 66, the coupling 50 is particularly suited to 20 mm conventional electrical conduits. For example, referring to Figure 35, typical dimensions of the male-female coupling accessory 116 are provided. Dimension A is typically of the order of 4 mm, dimension B is typically of the order of 6 mm, dimension C is typically of the order of 9 mm, and dimension D is typically of the order of 4 mm. It is to be appreciated that the coupling may have any suitable dimensions and/or shape depending on its application.

The Applicants believe that the invention, as illustrated, provides a coupling 50 which facilitates the attachment of an electrical conduit 62 to a casing 64 of a downlighter box accessory 68, an elbow joint coupling accessory 70, a four-way conduit box accessory 72, a wall socket box accessory 74, or the like. For example, during building operations electrical conduits, extending downwardly from a slab (not shown) and which are to be coupled to the downlighter box accessory 68, may not lie parallel to each other and connection thereof to a conventional downlighter box may thus be troublesome. The Applicants believe that with the coupling 50 the electrical conduits may be attached to the downlighter box

with enhanced ease as the conduit socket 80 may be tilted to an appropriate angle. Further, in the event of relative displacement between the electrical conduit 62 and the casing 66, conventional plug-in arrangements tend to unclip and thereby expose electrical cables which run in the electrical conduits.

- 5 However, the Applicants believe that as the coupling 50 allows tilting between the electrical conduit 62 and the casing 66 this problem may at least be alleviated.

CLAIMS

1. A coupling for coupling an electrical conduit to a casing, the coupling including attachment means which is configured to attach the electrical conduit to the casing in such a fashion so as to allow the conduit to tilt relative to the casing.
- 5 2. A coupling as claimed in Claim 1, which includes  
a first connecting component connectable to the electrical  
conduit; and  
a second connecting component connectable to the casing, the attachment  
means attaching the first and the second connecting components to each other  
10 and being configured to allow the first and the second connecting components to  
tilt relative to each other.
3. A coupling as claimed in Claim 2, in which the attachment means includes  
a socket formation and a complementary head formation which is receivable within  
the socket formation, the socket and head formations being configured to allow  
15 them to tilt relative to each other.
4. A coupling as claimed in Claim 3, in which the head formation is part-  
spherical in shape including a passage defined therein through which an electrical  
cable passes in use.
5. A coupling as claimed in Claim 3 or Claim 4, in which the first connecting

component defines the head formation and the second connecting component defines the socket formation.

6. A coupling as claimed in Claim 3 or Claim 4, in which the first connecting component defines the socket formation and the second connecting component  
5 defines the head formation.

7. A coupling as claimed in any one of the preceding claims 3 to 6, inclusive, in which the head formation is receivable at least partially within the socket formation in a snap-fit fashion.

8. A coupling as claimed in any one of the preceding claims 3 to 7, inclusive,  
10 in which the head formation is receivable within the socket formation with a friction fit.

9. A coupling as claimed in any one of the preceding claims 2 to 8, inclusive, in which the first connecting component includes first connection means for connecting it to the electrical conduit, the first connection means being in the form  
15 of a conduit socket which is shaped and dimensioned to receive an end of the electrical conduit.

10. A coupling as claimed in Claim 9, in which the conduit socket is formed by a portion of hollow tubing having an internal diameter which marginally exceeds and outer diameter of the electrical conduit so that the end of the electrical conduit

is snugly receivable therein.

11. A coupling as claimed in any one of the preceding claims 2 to 10, inclusive, in which the second connecting component includes second connection means for connecting it to the casing.
- 5 12. A coupling as claimed in Claim 11, in which the second connection means is in the form of a circular peripheral lip which is receivable within a circular opening defined in the casing with a friction fit.
13. A coupling as claimed in any one of the preceding claims 9 to 12, in which one of the first and the second connection means is in the form of a hollow  
10 cylindrical tubular member which is shaped and dimensioned to be receivable within a conventional cylindrical formation of a conventional casing thereby to convert the conventional casing for connection to the coupling.
14. A coupling as claimed in any one of the preceding claims 2 to 13, inclusive, in which the second connecting component is formed integrally with the casing.
- 15 15. A coupling as claimed in any one of the preceding claims, in which the attachment means is substantially similar to a ball-and-socket joint.
16. A connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a head formation which is receivable in a socket formation of the composite coupling, and connection

means configured to connect the connecting component to the electrical conduit.

17. A connecting component of a composite coupling for coupling and electrical conduit to a casing, the connecting component including a head formation which is receivable in a socket formation of the composite coupling, and connection  
5 means configured to connect the connecting component to the casing.

18. A connecting component as claimed in Claim 16 or 17, in which the head formation is part spherical in shape including a passage defined therein into which an electrical cable passes in use.

19. A connecting component of a composite coupling for coupling an electrical  
10 conduit to a casing, the connecting component including a socket formation in which a head formation of the composite coupling is receivable, and connection means configured to connect the connecting component to the electrical conduit.

20. A connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a socket formation in  
15 which a head formation of the composite coupling is receivable, and connection means configured to connect the connecting component to the casing.

21. A connecting component as claimed in Claim 17 or Claim 20, in which the connection means includes a plurality of resilient members arranged circumferentially and biased radially outwardly and configured to be received

within an opening in the casing in a lockable fashion.

22. A connecting component as claimed in Claim 17 or Claim 20, in which the connection means includes an externally screw-threaded shaft for receiving a locking, the screw-threaded shaft being insertable through an opening in the casing  
5 thereby to connect the composite coupling to the casing.

23. A connecting component as claimed in Claim 17 or Claim 20, in which the connection means includes a gland-bolt arrangement for compressing a gland into frictional engagement with an electrical cable passing therethrough.

24. A connecting component as claimed in Claim 16 or Claim 19, in which the  
10 connection means is in the form of a conduit socket which is shaped and dimensioned to receive an end of the electrical conduit.

25. A connecting component as claimed in Claim 24, in which the conduit socket is formed by a portion of hollow tubing having an internal diameter which marginally exceeds an outer diameter of the electrical conduit so that the end of  
15 the electrical conduit is snugly receivable therein.

26. A connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including two head formations which are mounted relative to each other in a back-to-back fashion and which are each receivable in a socket formation of the composite coupling.

27. A connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including a socket formation and a complementary head formation which are mounted relative to each other in a back-to-back fashion.

5 28. A connecting component as claimed in Claim 26 or Claim 27, in which the head formation is part spherical in shape including a passage defined therein through which an electrical cable passes in use.

29. A closure member of a composite coupling for coupling an electrical conduit to a casing, the closure member including a head formation which is receivable  
10 within a socket formation of a connecting component of the composite coupling thereby to close the socket formation.

30. A connecting component of a composite coupling for coupling an electrical conduit to a casing, the connecting component including two socket formations which are mounted relative to each other in a back-to-back fashion and which are  
15 shaped and dimensioned to receive a head formation of the composite coupling.

31. An electrical junction housing to which at least one electrical conduit is connectable by a composite coupling, the junction housing including  
a casing defining a hollow compartment into which an electrical cable passes  
in use;

20 at least one connecting component of the composite coupling, the



connecting component being connected to the casing and configured to engage a complementary connecting component of the composite coupling..to which complementary connecting component the electrical conduit is connectable, the connecting component being configured to allow the electrical conduit to tilt  
5 relative to the casing.

32. An electrical junction housing as claimed in Claim 31, in which the connecting component includes connection means connected to the casing, and a socket formation attached to the connection means, the socket formation being configured to receive a part-spherical head formation of the complementary  
10 connecting component.

33. An electrical junction housing as claimed in Claim 31, in which the connecting component includes connection means connected to the casing, and a part-spherical head formation which is receivable in a socket formation of the complementary connecting component.

15 34. An electrical junction housing as claimed in any one of claims 31 to 33, inclusive, in which the connecting component is formed integrally with the casing in a moulding of synthetic plastics material.

35. An electrical junction housing as claimed in any one of the preceding claims 31 to 34, inclusive, in which the casing is defined by a circular side wall, and a  
20 circular base which is fixedly attached to an end of the circular side wall to define

the hollow compartment.

36. An electrical junction housing as claimed in any one of claims 31 to 34, inclusive, in which the casing is defined by four rectangular side walls and a rectangular base from which the side walls extend transversely to define the  
5 hollow compartment.

37. An electrical junction housing as claimed in any one of claims 31 to 34, inclusive, in which the casing defines an elbow connection having opposed ends which are at a right-angle relative to each other, a connecting component being provided at each opposed end of the elbow connection.

10 38. An electrical junction housing as claimed in any one of claims 31 to 34, inclusive, in which the casing defines a longitudinal passage with a connecting component provided at each end thereof, and a transverse passage leading into the longitudinal passage at its one end and a connecting component being provided at its other end.

15 39. An electrical conduit installation in a building, the installation including a plurality of couplings as claimed in any one of the preceding claims 1 to 15.

40. A new coupling for coupling an electrical conduit to a casing, substantially as herein described and illustrated.

41. A new connecting component of a composite coupling for coupling an electrical conduit to a casing, substantially as herein described and illustrated.
42. A new closure member, substantially as herein described and illustrated.
43. A new electrical junction housing, substantially as herein described and  
5 illustrated.

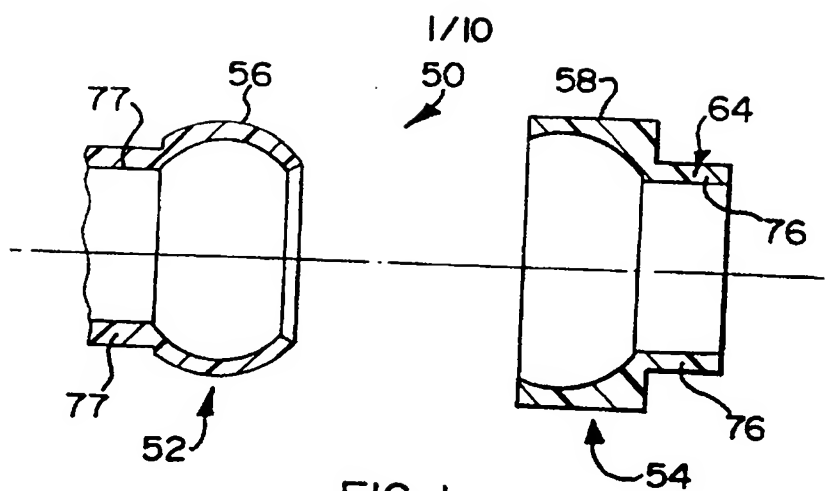


FIG 1

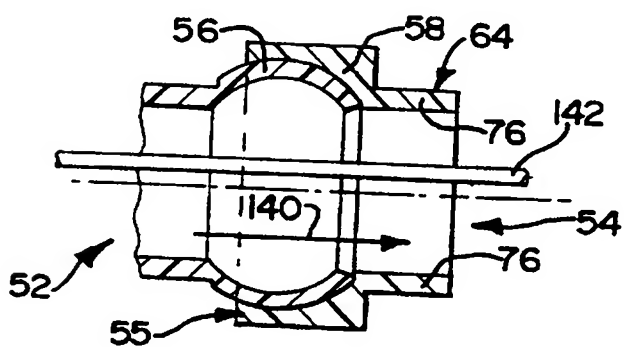


FIG 2

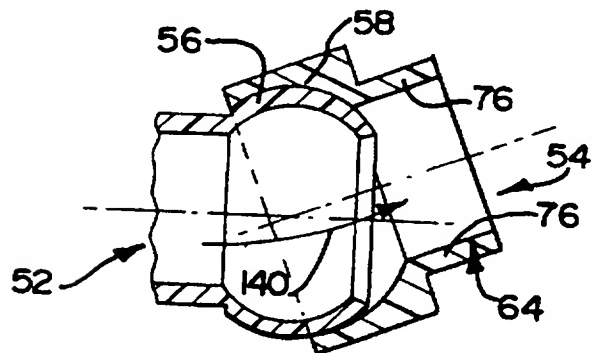


FIG 3

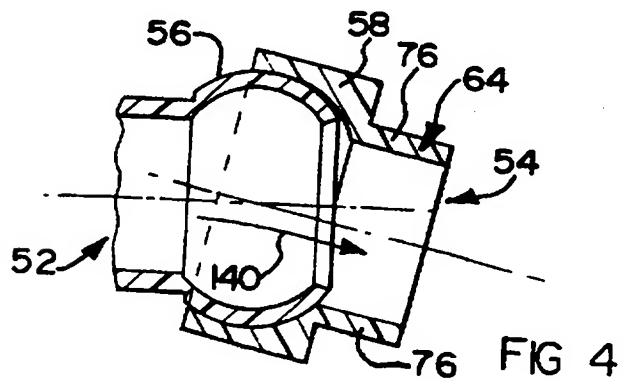


FIG 4



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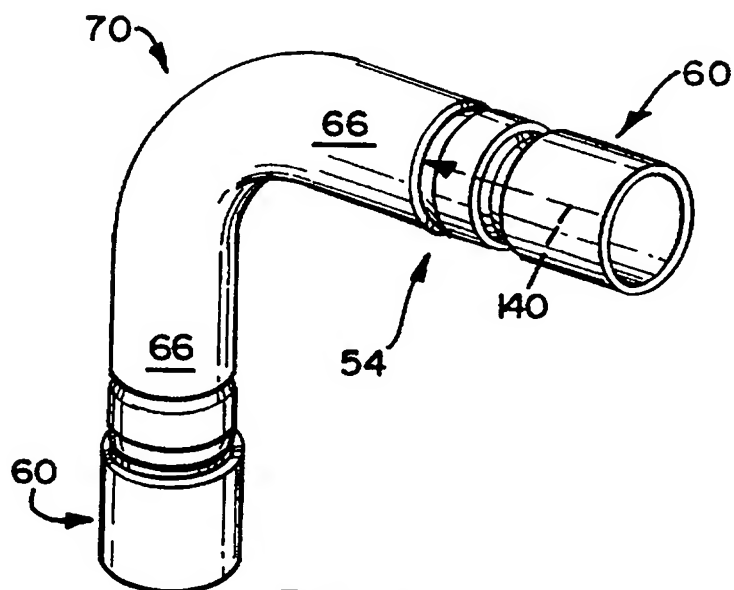


FIG 7

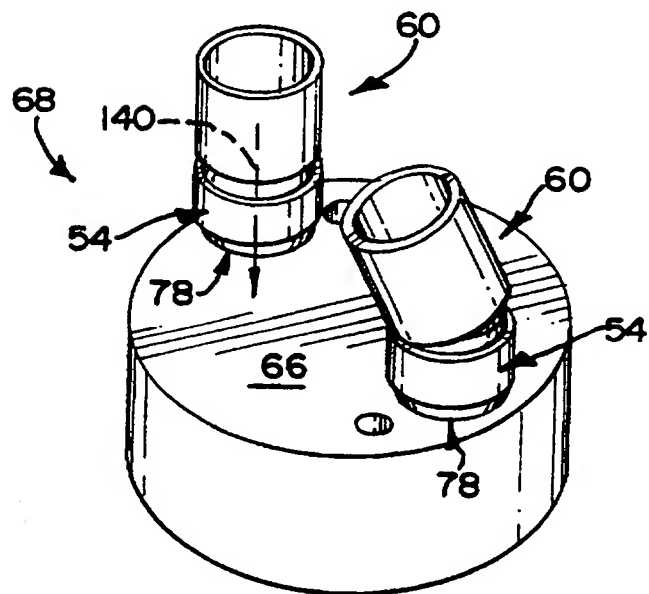


FIG 8

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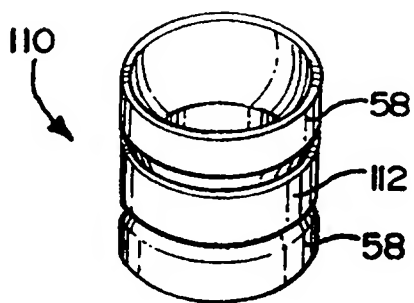


FIG 9

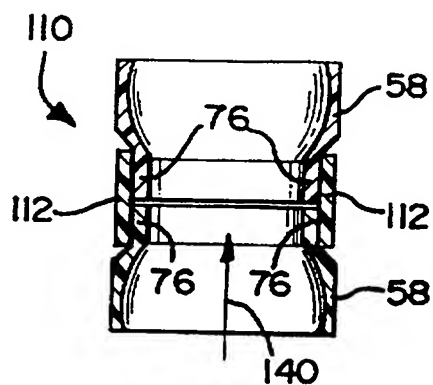


FIG 10

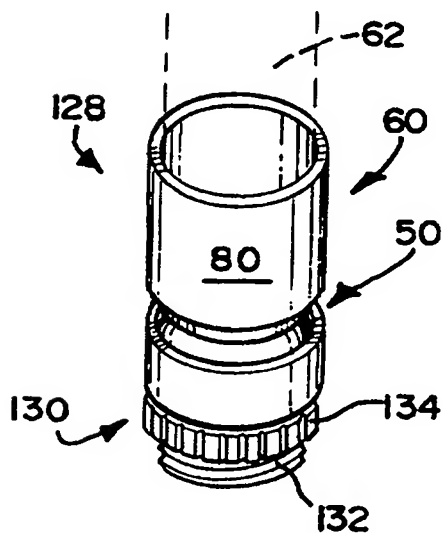


FIG 11

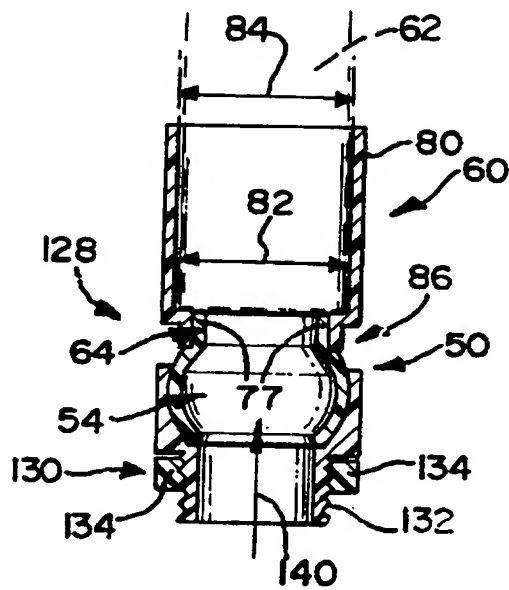


FIG 12

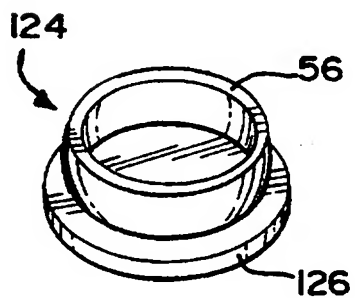


FIG 13

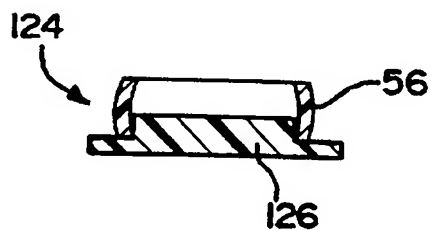


FIG 14

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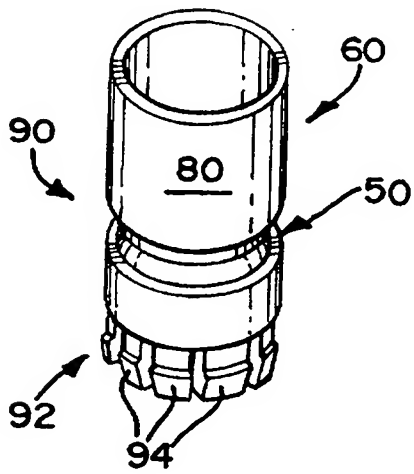


FIG 15

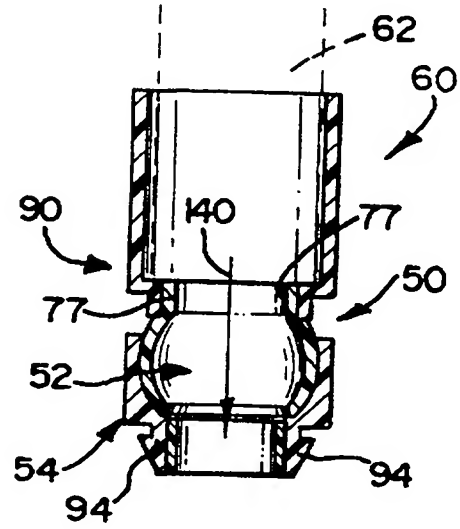


FIG 16

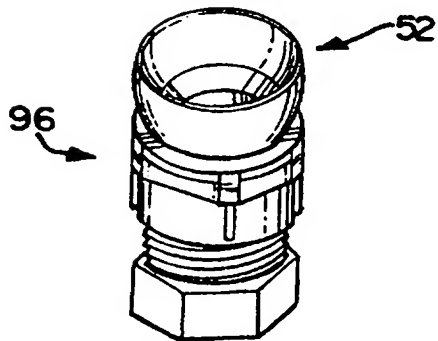


FIG 17

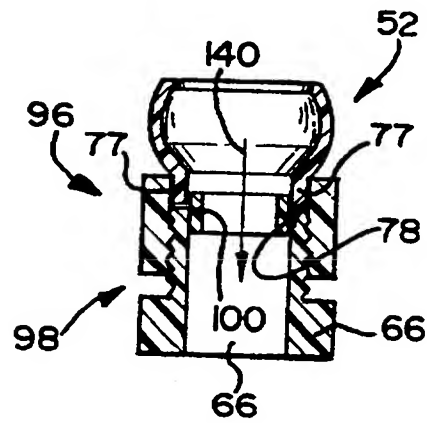


FIG 18



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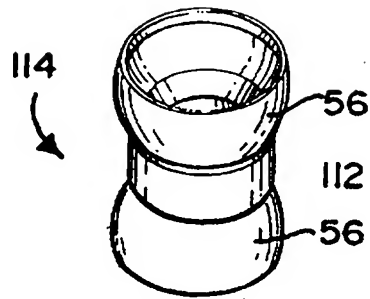


FIG 19

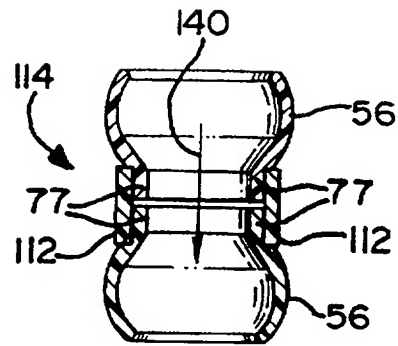


FIG 20

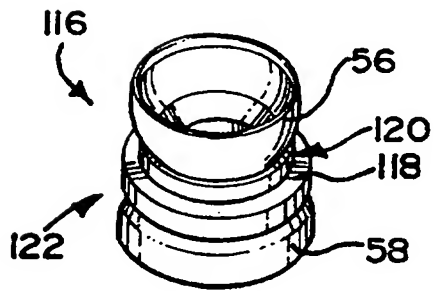


FIG 21

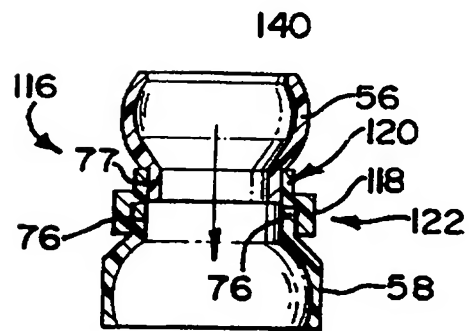


FIG 22

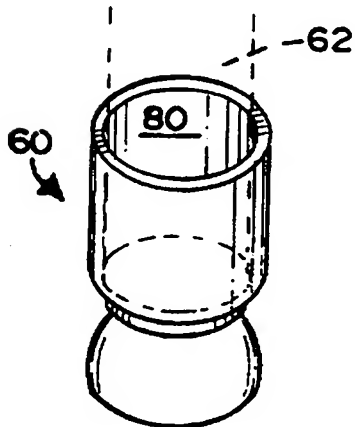


FIG 23

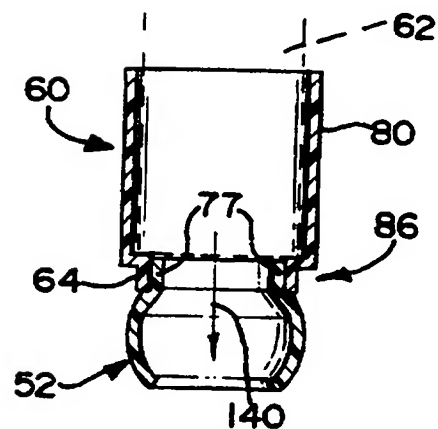
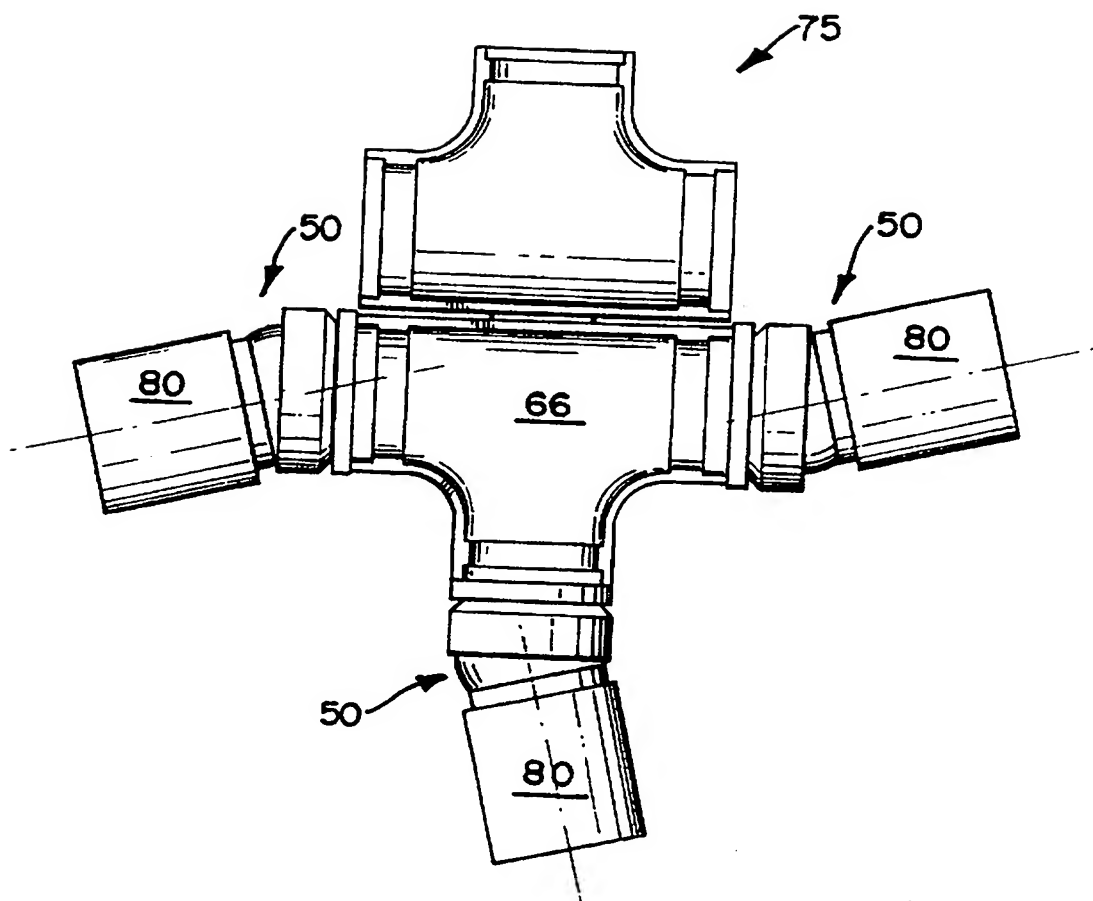


FIG 24

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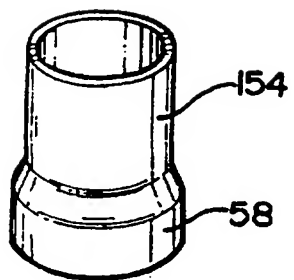
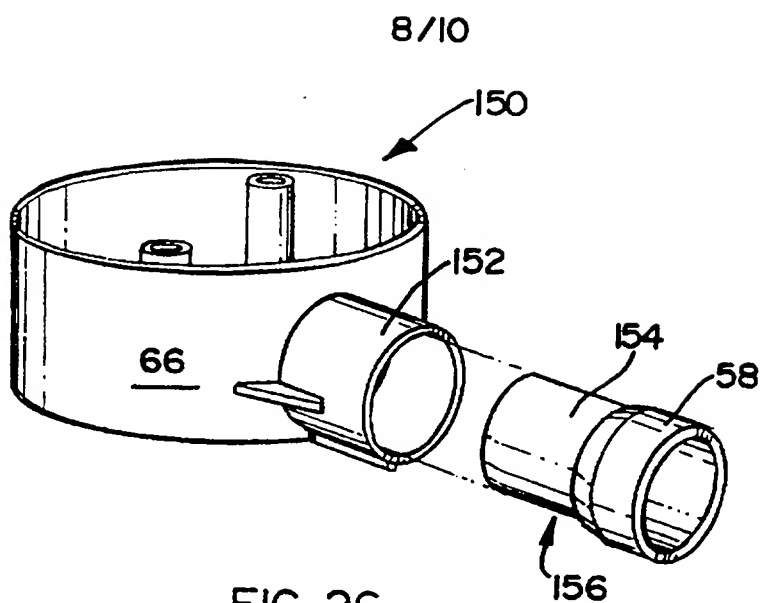


FIG 27

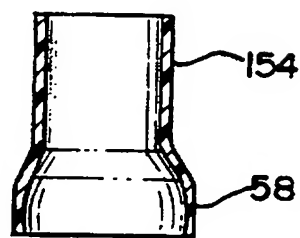


FIG 28

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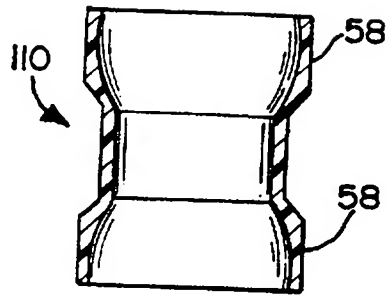


FIG 29

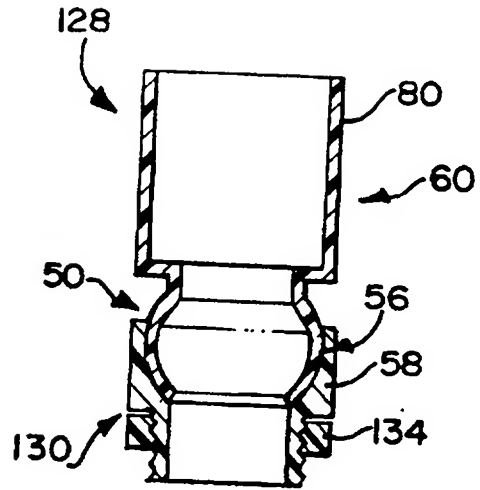


FIG 30

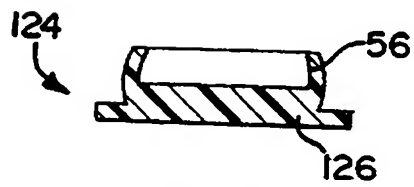


FIG 31

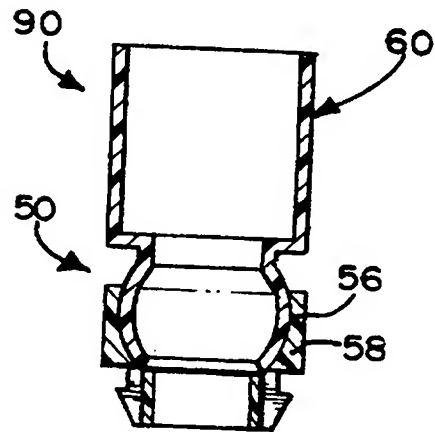


FIG 32

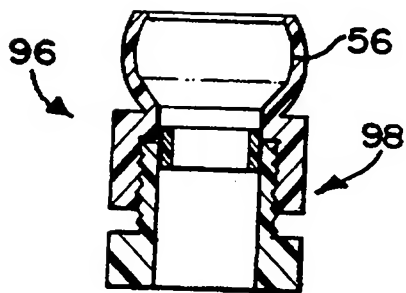


FIG 33

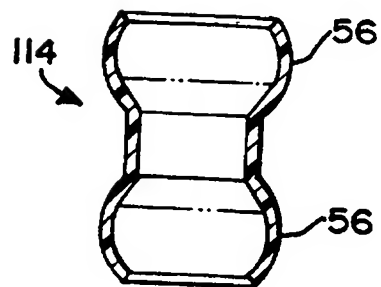


FIG 34

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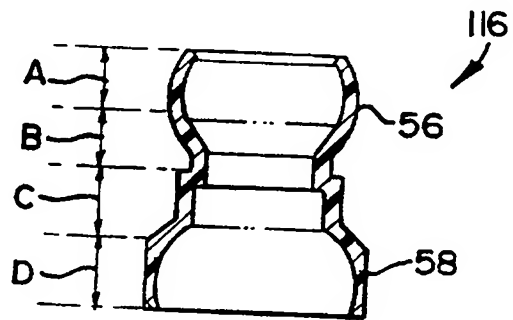


FIG 35

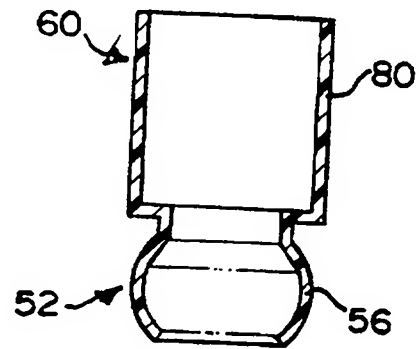


FIG 36

# INTERNATIONAL SEARCH REPORT

Internat. Application No.  
PCT/US 97/02450

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 H02G3/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 H02G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 132 492 A (WIEDER KLAUS) 21 July 1992  see the whole document ----	1-9, 11, 14-20, 29, 31-34, 36, 40-43
X	US 2 259 171 A (MILLER) 14 October 1941	1-7, 9-20, 24, 31-33
A	see the whole document ----	22, 25, 29
A	DE 90 17 373 U (LIC) 18 April 1991  see the whole document -----	1-7, 9, 10, 15, 16, 18, 19, 31-34

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

3 June 1997

Date of mailing of the international search report

11.06.97

Name and mailing address of the ISA

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Authorized officer:

Rieutort, A

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Internal Application No  
PCT/US 97/02450

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5132492 A	21-07-92	NONE	
US 2259171 A	14-10-41	NONE	
DE 9017373 U	18-04-91	NONE	